Original Article

Awareness, anchor and adjustment factors in the use of institutional repositories by Nigerian lecturers

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Abstract
Institutional repositories have been established in universities globally because of their immense benefits to various stakeholders, especially lecturers. However, the literature has confirmed that institutional repositories are little used by lecturers. Previous studies have examined attitudes and disciplines, for example, but there seems to be no study on anchor and adjustment factors. This study therefore investigated awareness and anchor and adjustment factors as determinants of use of institutional repositories by lecturers in Nigeria. A descriptive survey and a purposive sampling technique were used to select universities that had had functional institutional repositories for at least four years at the time of data collection. A questionnaire was used to collect data from 857 lecturers. The study reveals that awareness and anchor and adjustment factors are determinants of use of institutional repositories by lecturers in Nigerian universities. The study recommends that more awareness programmes should be organized by libraries and that lecturers should constantly use computers to improve their computer self-efficacy and computer playfulness.

Introduction

Institutional repositories are digital platforms for scholarly communication in the 21st century. Globally, institutional repositories are used as digital archives where scholarly works are deposited, and as information sources where scholarly works are accessed and retrieved. Prior to the establishment of institutional repositories, most libraries could not subscribe to many journals due to cuts in library budgets resulting from economic recessions globally. This made it difficult for scholars to access scholarly works and stay up to date with trends and developments in their different disciplines. Hence, the purpose of institutional repositories is to archive research findings; disseminate findings, trends and developments; and make access to research findings and trends by colleagues and the general public much easier. Therefore, institutional repositories are digital platforms that are used by institutions and organizations to archive, manage, disseminate and showcase their intellectual works.

There are immense benefits in using an institutional repository; its use as an archive enhances visibility for the author, thereby resulting in an increase in their citation rate, and it is also a marketing strategy for the author and the institution. An institutional repository also locates similar research work together, providing a central platform for related research findings. Moreover, its use as an information source enables researchers to access and retrieve relevant articles, keeping them abreast of trends and issues in their chosen discipline. It also empowers and speeds up their research

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work by providing access to what others have done in their discipline; they thereby stand on the shoulders of other scholars (Bamigbola, 2014; Cullen and Chawner, 2010; Jain, 2011; Omeluzor, 2014).

As a result of the notable benefits of institutional repositories, Electronic Information for Libraries motivated stakeholders in Nigeria (the Nigerian University Libraries Consortium and the Department of Library and Information Science at Ahmadu Bello University, Zaria) to organize the first open-access workshop, which was held at Ahmadu Bello University. Scholars, researchers, librarians, policymakers, information and communications technology experts, and editors-in-chief of peer-reviewed journals were in attendance (Christian, 2008). In addition, a follow-up workshop was held in November 2009 at Ahmadu Bello University and a third workshop was organized by Dr Joseph Ana of the *British Medical Journal*'s West Africa edition (Okoye, 2013). These initiatives and workshops, which were geared towards open science, resulted in the signing of the Budapest Open Access Initiative by seven institutions in Nigeria – namely, Ahmadu Bello University Press; the Federal College of Education, Akoka; the Forestry Association of Nigeria; the Science Education Development Institute; the College of Medicine at the University of Ibadan; Usmanu Dan Fodiyo University, Sokoto; and Wilolud Journals. Also, the Department of Library and Information Science at Ahmadu Bello University changed its two journals – the *Samaru Journal of Information Studies* and the *Information Manager* – to open access (Okoye, 2013). The most evident result of the aforementioned initiatives is the establishment of open-access institutional repositories in some Nigerian universities, although some of these are still at the development stage (preliminary data).

The establishment of institutional repositories in Nigerian universities therefore commenced in 2009, and the number has steadily grown over the past 11 years. According to the Directory of Open Access Repositories (OpenDOAR), as of August 2020, there were 30 institutional repositories in Nigeria; 27 of them are owned by 20 universities. Out of the 170 universities in Nigeria, 14 universities own one institutional repository each, five universities own two institutional repositories each, while one university owns three institutional repositories. Two of the institutional repositories belong to the discipline of health and medicine (the College of Medicine at the University of Ibadan and the medical librarians in Kenya, Mali, Nigeria, Zambia and Zimbabwe) and one is owned by the Central Bank of Nigeria.[1]

However, in spite of all the benefits of using institutional repositories, one of the persistent challenges for institutional repositories globally is the low rate of submission of scholarly works by lecturers, who are the major stakeholders (Chilimo, 2016; Gunasekera, 2017; Yang and Li, 2015). In Nigeria, previous studies have also confirmed the lack of use of institutional repositories by lecturers (Bamigbola, 2014; Bamigbola and Adetimirin, 2017; Ivwighreghweta, 2012; Ogbomo, 2012). The low submission of scholarly works into institutional repositories by lecturers has constituted a major problem for the success of the establishment of institutional repositories because institutional repositories without content are like empty shelves in a library, and their purpose is defeated. As a result, previous studies, internationally and in Nigeria, have investigated variables such as, for example, attitude, discipline, awareness, institutional factors, demographic factors and social factors (Bamigbola, 2014; Creaser et al., 2010; Dutta and Paul, 2014; Ogbomo, 2012). The problem of the low use of institutional repositories by lecturers persists, especially in Nigeria; hence, there is a need to examine other factors that might be responsible for this problem. There seems to be no study that has examined the combination of awareness and anchor and adjustment factors in the use of institutional repositories by lecturers in Nigerian universities. Premised on this, this study examined the low use of institutional repositories by lecturers in Nigerian universities by investigating awareness and anchor and adjustment factors as determinants of the use of institutional repositories.

It is obvious that awareness of any phenomenon or innovation precedes its use. Awareness is a state of consciousness of the existence, potentials and viability of something. Dutta and Paul (2014) averred that a lack of awareness of the institutional repository was the main problem in the low use of the institutional repository by most of the faculty members at the University of Calcutta. Therefore, there is a relationship between awareness and the use of an institutional repository. Awareness of the existence, potentials and benefits of institutional repositories by lecturers could determine their use.

Anchor and adjustment factors are variables adapted from Technology Acceptance Model 3 (TAM 3), propounded by Venkatesh and Bala (2008). TAM was originally proposed by Davis in 1989. TAM is used to predict the adoption and use of new information technology. The model proposes that the acceptance and use of a new technology by users are influenced by two beliefs or perceptions – that is, perceived usefulness and perceived ease of use. TAM was expanded, which resulted in TAM 2 (Venkatesh and Davis, 2000). Venkatesh and Davis (2000) proposed five general determinants of perceived usefulness: subjective norm, image, job relevance, output quality and result demonstrability.

In addition, they proposed two moderators: experience and voluntariness. Venkatesh and Bala (2008: 278) extended TAM 2 to include determinants of perceived ease of use and perceived usefulness, which resulted in TAM 3. In particular, anchor factors (computer self-efficacy, perceptions of external control, computer anxiety and computer playfulness) and adjustment factors (perceived enjoyment and objective usability) were added as determinants of perceived ease of use. Therefore, this study was anchored by the determinants of perceived ease of use as proposed by Venkatesh and Bala (2008: 279) in TAM 3. This was done because perceived ease of use has been submitted to be a stronger predictor of intention to use and actual usage of any technological innovation, especially in developing countries (Miller and Khera, 2010).

Anchor factors are general beliefs about computers and their usage, which are based on three general constructs: control, intrinsic motivation and emotion (Venkatesh, 2000). Control is divided into perception of internal control (computer self-efficacy) and perception of external control (facilitating conditions). Intrinsic motivation is computer playfulness, while emotion is conceptualized as computer anxiety. Therefore, the anchor factors are computer self-efficacy, perception of external control, computer playfulness and computer anxiety.

Adjustment factors are the second variable that was added to TAM 2 to form TAM 3 by Venkatesh and Bala (2008). It is noted that the initial assessment of ease of use of any system is driven by anchor factors, but after a direct experience with a new system for a period of time, individuals adjust those judgments. There are two system characteristics related to adjustments – perceived enjoyment and objective usability, which determine perceived ease of use (Venkatesh, 2000).

This article therefore investigates awareness, anchor and adjustment factors as determinants of the use of institutional repositories by lecturers in Nigerian universities.

Objectives of the study

The main objective of the study was to investigate awareness, anchor and adjustment factors as determinants of the use of institutional repositories by lecturers in Nigerian universities. In order to achieve this, the specific objectives were to:

1. ascertain the relationship between awareness and the use of institutional repositories by lecturers in Nigerian universities;
2. examine the relationship between anchor factors and the use of institutional repositories by lecturers in Nigerian universities;
3. establish the relationship between adjustment factors and the use of institutional repositories by lecturers in Nigerian universities;
4. examine the composite contribution of awareness and anchor and adjustment factors to the use of institutional repositories by lecturers in Nigerian universities;
5. ascertain the relative contributions of awareness and anchor and adjustment factors to the use of institutional repositories by lecturers in Nigerian universities.

Hypotheses

Five null hypotheses guided the study:

1. There is no statistically significant relationship between awareness and the use of institutional repositories by lecturers in Nigerian universities.
2. There is no statistically significant relationship between anchor factors and the use of institutional repositories by lecturers in Nigerian universities.
3. There is no statistically significant relationship between adjustment factors and the use of institutional repositories by lecturers in Nigerian universities.
4. There is no statistically composite contribution of awareness, anchor and adjustment factors to the use of institutional repositories by lecturers in Nigerian universities.
5. There are no statistically relative contributions of awareness, anchor and adjustment factors to the use of institutional repositories by lecturers in Nigerian universities.

Literature review

Relevant literature on the variables was reviewed, as outlined below.

Awareness and the use of institutional repositories by lecturers

The level of awareness might, to a great extent, determine the use of any system. In the words of Dinev and Hu (2005: 402): 'awareness raises consciousness and knowledge about a certain technology, its personal and social benefits'. Velmurugan and Velmurugan (2014) submitted that awareness is a key determinant of consumers' adoption behaviour. They ascertained that awareness was the central determinant of users'

attitudes and behaviour towards technology in their study in Florida.

Obviously, without awareness of the existence of an innovation, the issue of using such an innovation cannot arise. It is possible, for example, to be aware of the existence of an institutional repository but unaware of its concept. Ivwighreghweta (2012) investigated the challenges of the development of institutional repositories in six academic institutions in Nigeria and discovered that, despite the fact that 60% of the researchers and policymakers had complete awareness of the institutional repositories, only 7% had deposited their scholarly works in the institutional repositories.

The use of institutional repositories is based on awareness of the concept of institutional repositories – their purposes, benefits, impact and existence within an institution. Yang and Li (2015) revealed that the level of awareness of the OAKTrust digital repository at Texas A&M University was low. Out of 295 faculty members from 10 colleges/schools, only 27% were aware of the existence of OAKTrust, and only 7% had deposited work in OAKTrust. In the same vein, Chilimo (2016) found that out of 317 academic researchers in five public universities in Kenya, only 169 (53.3%) were aware of the existence of their university's institutional repository, while 31% were aware of its policy, resulting in the low use of institutional repositories.

Singeh et al. (2013), in their survey of the factors that inhibited authors from self-archiving in five Malaysian research-intensive universities, noted that awareness was indispensable to self-archiving. Yang and Li (2015) disclosed that the level of awareness of institutional repositories by lecturers was low, which resulted in low usage. Awareness of an institutional repository could be limited to just knowing about the basic concept or its existence, and awareness of its purposes and benefits, and the different policies regarding its use, might yet to be uncovered. Previous studies have established that there is a very wide gap and low awareness of institutional repositories at the policy level globally, especially in Africa, which has resulted in the low use of institutional repositories (Chilimo, 2016).

Anchor factors and the use of institutional repositories by lecturers

Venkatesh and Bala (2008) added anchor factors to TAM, which comprise four elements that are external factors and influence the perceived ease of use and, eventually, use of any system. These factors are computer self-efficacy, perception of external control, computer anxiety and computer playfulness. It is believed that an individual's computer self-efficacy is a prerequisite for the use of any system or technology. Achim and Al Kassim (2015) affirmed that computer self-efficacy determined the use of computers by 50 employees at the Malaysia Civil Defence Force headquarters. However, Jeffrey (2015) established that computer self-efficacy did not significantly determine the use of a learning management system by 200 faculty members from 13 Adventist universities in the USA and Canada.

Perception of external control, as another anchor factor, might determine the use of institutional repositories by lecturers. Venkatesh (2000) explained that perception of external control is an individual's belief that organizational and technical resources are available to support the use of a system. The implication is that lecturers will use institutional repositories if there is institutional and technical resource support. According to Adetimirin's (2015) study, there is a positive relationship between perception of external control and use. Adetimirin's study found that perception of control positively influenced the use of an online discussion forum by library and information studies postgraduate students at the University of Ibadan, Nigeria.

Previous studies have averred that computer anxiety determines the use of any technological innovation/system (Adetimirin, 2015; Cowan et al., 2009). Computer anxiety is the apprehension/uneasiness felt by individuals when considering using a system. According to Cowan et al. (2009), computer anxiety influences use. They found that computer anxiety had a negative significant relationship with the use of a wiki (Psykowiki) by 92 second-year undergraduate psychology students at the University of Edinburgh. Wiki anxiety negatively affected their usage of the wiki. The students who had high wiki anxiety rated the wiki as less usable, while students with low wiki anxiety used the wiki more and rated it as usable. It is to be expected that anxiety will affect self-efficacy, and once self-efficacy is negatively affected, it reduces the usage of any technology/system. Similarly, Adetimirin (2015) found that computer anxiety had a significant negative relationship with the use of an online discussion forum by postgraduate students in library and information studies, implying that an increase in computer anxiety on the part of the postgraduate students would reduce their use of the online discussion forum. Hence, lecturers who are anxious about using computers are not likely to use institutional repositories, and computer anxiety might determine the use of institutional repositories by lecturers.

Computer playfulness is an anchor factor that might also have a direct relationship with use. Lin et al. (2005) confirmed that computer playfulness significantly contributed to use and the intention to reuse a website by 300 undergraduate students at a management school in Taiwan. However, Al-Gahtani's (2016) study discovered that computer playfulness did not significantly influence the use of an e-learning system by 286 students from three male (science, business and engineering) colleges, three female (science, arts and literature) colleges and a girls' study centre at a large Saudi Arabian university in the Southern Region.

Adjustment factors and the use of institutional repositories by lecturers

Adjustment factors comprise two constructs: computer enjoyment and objective usability (Venkatesh and Morris, 2000). Previous studies have affirmed the relationship between the construct of computer enjoyment and the use of technology in general (Alenezi et al., 2010; Chin and Ahmad, 2015). However, there seems to be no study on the use of institutional repositories and adjustment factors. Alenezi et al.'s (2010) study established that computer enjoyment had a positive significant influence on 408 students' use of e-learning at five universities in Saudi Arabia. Similarly, Chin and Ahmad's (2015) study revealed that perceived enjoyment had a positive significant relationship with the intention to use single-platform e-payment by 389 Malaysian consumers. Contrary to the above studies, Wahab et al. (2011) found that enjoyment had a negative significant relationship with the electronic customer relationship management performance of 488 students from five universities in the northern, southern and central states of Jordan. This difference might have been the result of the different locations.

Venkatesh (2000) described objective usability as comparing systems based on the actual level of effort required to complete specific tasks. Usability as a construct can be evaluated through direct observation of users as they use technology, the objective use of logs or computer-recorded objective use. Otherwise, usability can be measured subjectively – that is, perceived usability or self-reported use, as in the case of this study (Al-Gahtani, 2016; Wahab et al., 2011; Zhang et al., 2013). Wahab et al. (2011) measured perceived usability and found a positive relationship between perceived usability and the electronic customer relationship management performance of 488 students at five universities in Jordan.

Methodology

A descriptive correlational survey was used for this study. A purposive sampling technique was used to select universities that had had functional institutional repositories for at least four years at the time of data collection. It is believed that before a usability study can be conducted on any innovation, that innovation should have been used for at least four years. Only five universities met the criterion: Ahmadu Bello University, Zaria; Covenant University, Ota; the Federal University of Technology, Akure; the University of Jos; and the University of Nigeria, Nsukka. A random sampling technique was used to select 1151 lecturers (50% of the population) from five faculties that were common to the universities in the study, and the data was collected with a structured questionnaire (see Appendix 1). The items on anchor and adjustment factors in the questionnaire were adapted from TAM 3, and 857 copies of the questionnaire were returned and found usable.

The items were adapted from Venkatesh (2000) and Venkatesh and Bala (2008); where the original items of the questionnaire stated 'computer', 'system' and 'software', it was changed to 'institutional repository'. Each of the constructs has a reliability coefficient: computer self-efficacy: $\alpha = .80$, perceived external control: $\alpha = .76$, computer playfulness: $\alpha = .77$, and computer anxiety: $\alpha = .73$. The items measuring the 'adjustment factors' were adapted from Venkatesh (2000) and Venkatesh and Bala (2008); where the original items of the questionnaire stated 'computer', it was changed to 'institutional repository', and the reliability coefficient is $\alpha = .84$. The items measuring the use of institutional repositories were adapted from Venkatesh (2000) and Venkatesh and Bala (2008); where the original items of the questionnaire stated 'computer', it was changed to 'institutional repository', and the reliability coefficient is $\alpha = .88$.

The instrument was pretested with 30 lecturers from the Faculty of Pharmaceutical Science at the University of Nigeria who were not part of the main study; 24 copies of the questionnaire were retrieved, giving a response rate of 80%. The reliability coefficient was calculated using the Cronbach's α coefficient to establish the psychometric properties. The values were as follows: awareness: $\alpha = .83$; anchor factors: computer self-efficacy: $\alpha = .89$, perceived external control: $\alpha = .86$, computer playfulness: $\alpha = .78$, and computer anxiety: $\alpha = .87$; and adjustment factors: perceived enjoyment: $\alpha = .87$, perceived usability: $\alpha = .86$, and use of institutional repositories: $\alpha = .87$.

Thereafter, the collection of data for the main study was carried out by the researcher and seven research assistants. The research ethics of each university studied were duly followed by the researcher. The researcher was given a list of lecturers in each department with their designation, and the sample was randomly selected. In addition, the consent of each lecturer was sought, and they voluntarily agreed to be respondents for the study. It was a 'paper-and-pencil' survey; the questionnaire was in English; and copies were distributed to the randomly selected lecturers by the researcher. Subsequently, the research assistants were sent to follow up and thereafter the completed questionnaires were collected.

The data was analysed at the .05 level of significance, being a behavioural science study. The variables are continuous and linear, and the data sets were normally distributed, hence Hypotheses 1 to 3 were tested using Pearson's product-moment correlation for relationships between each of the independent variables (awareness and anchor and adjustment factors) and the dependent variable (use of institutional repositories). In addition, multiple regression analysis was carried out on Hypotheses 4 and 5 to predict the relative as well as joint contributions among the independent and dependent variables because of the linear relationships of the variables and the multivariate normality of the data.

Conceptual model

The conceptual model in Figure 1 shows the relationship between the independent variables (awareness, anchor and adjustment factors) and the dependent variable (use of institutional repositories) guided this study.

Results

The results in Table 1 reveal that the highest number of respondents (190, 22.1%) were in the 35–39 age range; 646 (75.3%) were male; 560 (65.3%) were PhD holders; and the highest number of respondents (243, 28.3%) were found in the Lecturer I cadre. In addition, the highest number of respondents (271, 31.6%) had work experience of 6–10 years, and, lastly, the highest number (251, 29.1%) were in the Faculty of Science and the lowest (94, 10.9%) in the Faculty of Education. The distribution of the respondents, based on the results, indicates that a large number of the respondents were young, many of them were male and holders of a doctoral degree, and a large number were lecturers in
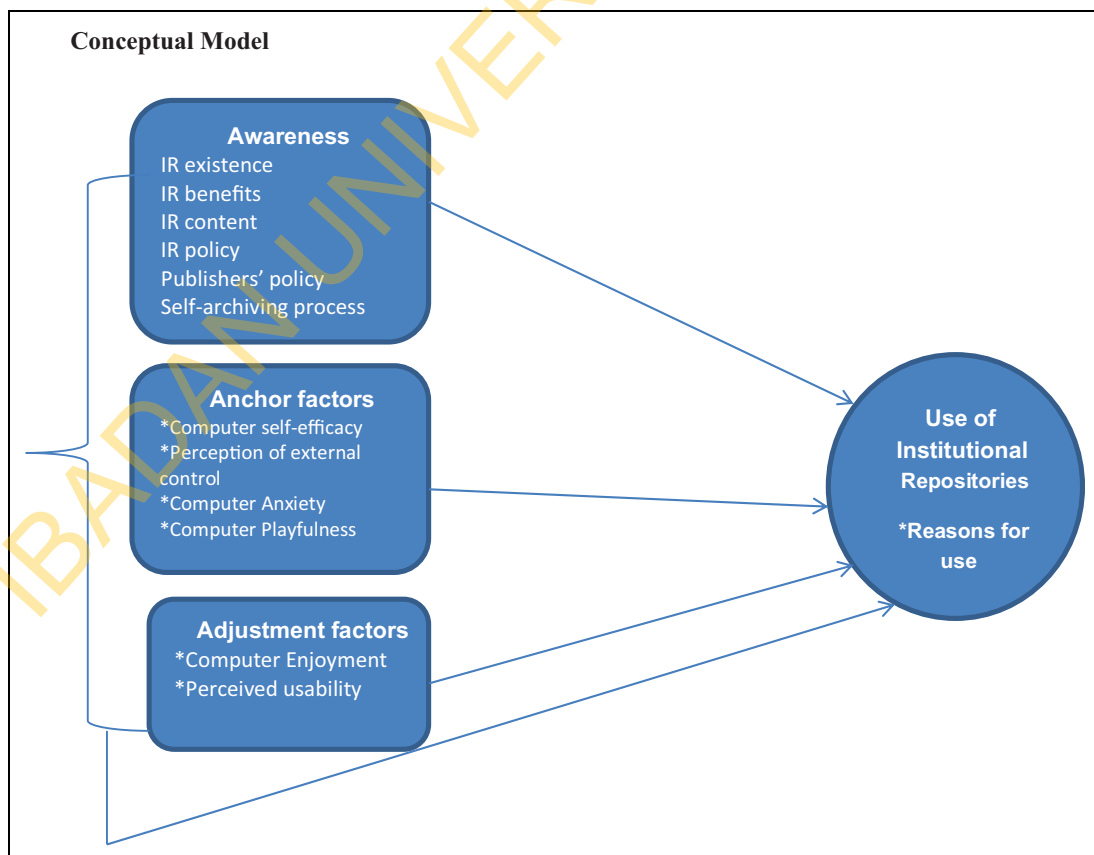
Figure 1. Conceptual model for the study.

between the lecturer grades I and II. Furthermore, many of them had work experience of between 6 and 10 years, and a large number of the respondents were working in the fields of science and environmental sciences.

Table 1. Demographic information of the respondents.

Demographic characteristics	Category	Frequency (N = 857)	%
Age range	25–29	47	5.4
	30–34	122	14.2
	35–39	190	22.1
	40–44	186	21.7
	45–49	168	19.6
	50–54	90	10.5
	55–59	45	5.2
	60–64	8	0.9
	65+	1	0.1
Gender	Male	646	75.3
	Female	211	24.6
Education	Master's	252	29.4
	PhD	560	65.3
	Other	45	5.2
Rank	Assistant Lecturer	132	15.4
	Lecturer II	224	26.1
	Lecturer I	243	28.3
	Senior Lecturer	157	18.3
	Reader	66	7.7
	Professor	35	4.0
Years of work experience	1–5	226	26.6
	6–10	271	31.6
	11–15	213	24.6
	16–20	104	12.1
	21–25	42	4.9
	26+	1	0.1
Faculty	Arts	126	14.7
	Education	94	10.9
	Environmental Sciences	210	24.5
	Science	251	29.1
	Social Sciences	176	20.5

Hypothesis testing

The results of Hypotheses 1 to 3 are presented in Table 2. The results of Hypotheses 4 and 5 are presented in Tables 3 and 4, respectively.

Hypothesis 1. There is no statistically significant relationship between awareness and the use of institutional repositories by lecturers in Nigerian universities. The data in Table 2 shows that there was a positive and low statistically significant relationship between awareness ($r = .296*$, $N = 857$, $p < .05$) and the use of institutional repositories by lecturers in Nigerian universities. This implies that to improve lecturers' use of institutional repositories, there must be an improvement in the level of awareness. Therefore, this null hypothesis is rejected.

Hypothesis 2. There is no statistically significant relationship between anchor factors and the use of institutional repositories by lecturers in Nigerian universities. Table 2 reveals that the correlation coefficient between the anchor factors and the use of institutional repositories was significant ($r = .243*$, $N = 857$, $p < .05$). This implies that there was a positive low statistically significant relationship between the anchor factors and the use of institutional repositories by lecturers in Nigerian universities. Therefore, this null hypothesis is rejected.

Hypothesis 3. There is no statistically significant relationship between adjustment factors and the use of institutional repositories by lecturers in Nigerian universities. The data in Table 2 shows that there was a positive moderate statistically significant relationship between the adjustment factors ($r = .527*$, $N = 857$, $p < .05$) and the use of institutional repositories by lecturers in Nigerian universities. Therefore, this null hypothesis is rejected.

Table 2. Correlation matrix showing the relationship among the independent variables and the dependent variable (use of institutional repositories).

Variable	Use of institutional repositories	Awareness	Anchor factors	Adjustment factors
Use of institutional repositories	1			
Awareness	.296* .000	1		
Anchor factors	.243* .000	.417* .000	1	
Adjustment factors	.527* .000	.435* .000	.580* .000	1
M	18.07	16.43	66.70	30.89
SD	12.806	3.775	11.270	8.166

$p = 0.05$.

Table 3. Summary of multiple regression analysis of composite contributions of awareness and anchor and adjustment factors to the use of institutional repositories by lecturers in Nigerian universities.

R			R^2			Adjusted R^2	SE of estimate
.541			.292			.290	10.79207
Sources of variance	Sum of squares	df		Mean squares	F		Sig.
Regression	40,317.421	3		13,439.140	115.388		.000*
Residual	97,600.854	839		116.469			
Total	137,918.276	841					

Table 4. Summary of multiple regression showing the relative contribution of the independent variables to the use of institutional repositories by lecturers in Nigerian universities.

Model	Understandardized coefficients β	Standardized coefficients SE	β	Rank	t	Sig.
(Constant)	−6.215	2.430			−2.558	.011
Awareness	.383	0.114	.110	2	3.356	.001*
Anchor factors	−.129	0.042	−.111	3	−3.071	.002
Adjustment factors	.860	0.058	.544	1	14.841	.000*

Hypothesis 4. There is no statistically composite contribution of awareness, anchor and adjustment factors to the use of institutional repositories by lecturers in Nigerian universities. The data in Table 3 shows that the composite contribution of awareness and anchor and adjustment factors to the prediction of the use of institutional repositories by lecturers was significant ($F(3,839) = 115.388$, $p < .05$). This implies that awareness and anchor and adjustment factors jointly predicted the use of institutional repositories by lecturers in Nigerian universities. It further reveals a multiple regression coefficient of $R = .541$ and the multiple regression adjusted $R^2 = .292$. The implication is that 29.2% of the variation in the lecturers' use of institutional repositories was accounted for by the joint effect of the independent factors when taken together; the remaining variation was due to other factors and residuals.

Hypothesis 5. There are no statistically relative contributions of awareness and anchor and adjustment factors to the use of institutional repositories by lecturers in Nigerian universities. Table 4 shows the relative contributions of awareness and anchor and adjustment factors to the use of institutional repositories by lecturers. The relative contributions of awareness ($\beta = .110$, $t = 3.356$, $p < .05$), anchor factors ($\beta = −.111$, $t = −3.071$, $p < .05$) and adjustment factors ($\beta = .544$, $t = 14.841$, $p < .05$) to the use of institutional

repositories by lecturers were statistically significant. Therefore, this null hypothesis is rejected.

In addition, Table 4 reveals the relative contributions of the independent variables to the prediction of lecturers' use of institutional repositories at different levels and ranks, as expressed by the *t*-values. The prediction power is shown as adjustment factors ($t = 14.841$, $p < .05$) > awareness ($t = 3.356$, $p < .05$) > anchor factors ($t = −3.071$, $p < .05$). Adjustment was the independent variable that strongly predicted the use of institutional repositories by lecturers; it was followed by awareness, while anchor factors were the lowest predictor of the use of institutional repositories by lecturers. The prediction equation is given as $y = −6.215 + 0.860x1 + 0.383x2 − 0.129x3$, where $y =$ use of institutional repositories, $−6.215 =$ constant, $x1 =$ adjustment factors, $x2 =$ awareness and $x3 =$ anchor factors, $* =$ correlation is significant at 0.05 level only.

Discussion

This study did not control for the possible interventions of confounding variables. Regarding the low prediction power of the regression model, it is possible that the results of this study would change if the confounding variables of gender, academic level (assistant, associate, professor), age (younger or older lecturers) and the academic disciplines of the lecturers were included in the analyses.

Awareness and the use of institutional repositories by lecturers in Nigerian universities

The study showed that there was a positive significant relationship between awareness of institutional repositories and the use of institutional repositories. It is evident that as the lecturers' level of awareness of institutional repositories increased, their use of institutional repositories also increased. Thus, level of awareness determines the usage of a facility. This finding is in line with Singeh et al. (2013), who submitted that awareness was indispensable to self-archiving by lecturers in five Malaysian research-intensive universities. However, the finding of this study is contrary to Dolan (2011). Dolan (2011) found that 94% of lecturers at West Virginia University had a very high level of awareness of their institutional repository but only 1% actually used it. This implies that awareness of an innovation or product may or may not lead to the actual use of that product.

Anchor factors and the use of institutional repositories by lecturers in Nigerian universities

The results showed that there was a positive significant relationship between the anchor factors (computer self-efficacy, perception of external control, computer anxiety and computer playfulness) and the use of institutional repositories by lecturers in universities in Nigeria. The implication of this finding is that lecturers with a high level of computer self-efficacy are more likely to use institutional repositories than lecturers with low computer self-efficacy. This finding is in line with previous studies. Achim and Al Kassim (2015) averred that there was a positive relationship between computer self-efficacy and the use of computers by 50 employees at the Malaysia Civil Defence Force headquarters. It is also in accordance with Adetimirin's (2015) study, which found a positive relationship between computer self-efficacy and the use of an online discussion forum by library and information studies postgraduate students.

Similarly, the findings revealed a positive relationship between perception of external control and the use of institutional repositories by lecturers in universities in Nigeria. This implies that when lecturers perceive that there is support for institutional repositories' staff and technical resources, they will use institutional repositories. This is in line with George and Ogunniyi's (2016) study, which revealed that perceived external control influenced the use of information and communications technology resources by science teachers in 10 high schools in two circuits of the North-West Cape in South Africa.

The study also revealed that computer anxiety had a negative relationship with the use of institutional repositories by lecturers in Nigeria. This means that the higher the level of computer anxiety, the lower the use of institutional repositories. This agrees with Adetimirin's (2015) study, which revealed that postgraduate students with a high level of computer anxiety made low use of an online discussion forum.

Finally, this study found that computer playfulness had a positive relationship with the use of institutional repositories by lecturers in Nigerian universities. The implication is that, as computer playfulness increases, so does the use of institutional repositories. Therefore, lecturers with a high level of computer playfulness will use institutional repositories more than lecturers with a low level of computer playfulness. This finding is in agreement with the study by Lin et al. (2005), which confirmed that computer playfulness significantly contributed to the use of and intent to reuse a website by 300 undergraduate students at a management school in Taiwan. However, Al-Gahtani's (2016) study does not support this finding. He discovered that computer playfulness did not significantly influence the use of an e-learning system by 286 students from three male (science, business and engineering) colleges, three female (science, arts and literature) colleges and a girls' study centre at a large Saudi Arabian University in the Southern Region.

Adjustment factors and the use of institutional repositories by lecturers in Nigerian universities

The study discovered that there was a positive moderate significant relationship between the adjustment factors (computer enjoyment and perceived usability) and the use of institutional repositories by lecturers in Nigerian universities. This finding corroborates previous studies. Alenezi et al. (2010) found that computer enjoyment influenced 408 students at five Saudi Arabian universities in their use of an e-learning platform. In addition, Chin and Ahmad's (2015) study revealed that computer enjoyment influenced the use of single-platform e-payment by 389 Malaysian consumers. Similarly, the finding is consistent with Wahab et al. (2011), who submitted that perceived usability influenced the use of electronic customer relationship management by 488 students at five Jordanian universities.

Awareness, anchor and adjustment factors in the use of institutional repositories by lecturers in Nigerian universities

The findings of this study revealed that the composite contribution of awareness and anchor and adjustment factors to the prediction of the use of institutional repositories by lecturers was significant. The implication is that when awareness and anchor and adjustment factors were taken together, they jointly predicted the use of institutional repositories by lecturers. It thus implies that with a high level of awareness of institutional repositories, high computer self-efficacy, a good perception of external control, low computer anxiety, a high degree of computer playfulness, perceived enjoyment and perceived usability, there will be a high use of institutional repositories. In addition, the findings showed the relative contributions of the independent variables to the prediction of lecturers' use of institutional repositories at different levels and ranks, as expressed by the *t*-values. The adjustment factors are the independent variables that strongly predict the use of institutional repositories by lecturers, followed by awareness, while the anchor factors are the least *t*-predictors of the use of institutional repositories by lecturers.

Conclusion and recommendations

Despite the benefits of university lecturers using institutional repositories, their low use by lecturers has become strikingly evident globally. This study investigated awareness and anchor (computer self-efficacy, perception of external control, computer playfulness and computer anxiety) and adjustment (perceived enjoyment and perceived usability) factors as determinants of the use of institutional repositories by lecturers in universities in Nigeria. The study found that awareness of institutional repositories, anchor factors and adjustment factors determined the use of institutional repositories by lecturers in Nigerian universities. It proved that if lecturers' awareness of institutional repositories is high, and their computer self-efficacy, perception of external control and computer playfulness are high, and they have low computer anxiety, their use of institutional repositories will be high.

Similarly, the study found that adjustment factors had a strong positive relationship with the use of institutional repositories; thus, if lecturers' perception of computer enjoyment and usability is high, their use of institutional repositories will be high. Therefore, the study concludes that awareness and anchor and adjustment factors are determinants of the use of institutional repositories by lecturers in Nigerian universities.

In order to increase the use of institutional repositories by lecturers in Nigerian universities, the study recommends that more awareness programmes should be organized by university library management teams. Institutional repository documentation, such as brochures and posters, should be developed and made available to lecturers. This will educate lecturers on the functions and benefits of institutional repositories, which might motivate them to deposit their scholarly works. Lastly, lecturers should improve their computer self-efficacy by constantly using computers, which will reduce their computer anxiety and increase their computer playfulness.

The implication of this study is that university management teams, university libraries and lecturers should ensure that each of the variables is given attention in the use of institutional repositories in universities in Nigeria. In particular, university libraries should provide adequate awareness programmes to properly inform lecturers of the immense benefits of depositing their scholarly works in an institutional repository. The university management team should make the submission of scholarly works to institutional repositories mandatory for lecturers' promotion by awarding points during promotion for scholarly works that have been submitted in an institutional repository and by giving certificates of recognition to lecturers who submit their scholarly works to the institutional repository. This might encourage lecturers to submit their scholarly works, and the huge investment in institutional repositories will not be wasted.

From the foregoing, it is evident that there is no alternative for Nigerian lecturers but to adapt to this new paradigm, as the use of institutional repositories is a starting point for embracing open science in the digital era. However, for the future of open science in Nigeria, there is the need to create awareness, national policy, infrastructure and capacity-building to support and exploit the potential of open science as a nation.

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Note

1. See the Directory of Open Access Repositories' (Open-DOAR) website at: http://www.opendoar.org/

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Author biography

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Appendix 1. Questionnaire on Awareness, Anchor and Adjustment factors in the use of institutional repositories by Nigerian lecturers.

Section A: Demographic Information

1. Name of your university: . . . .
2. Name of your faculty/school: . . . .
3. Name of your department: . . . .
4. Please indicate your age (years):
    a. 25–29 ☐   b. 30–34 ☐   c. 35–39 ☐
    d. 40–44 ☐   e. 45–49 ☐   f. 50–54 ☐
    g. 55–59 ☐   h. 60–64 ☐   i. 65–69 ☐   j. 69+ ☐
5. Gender: Male ☐   Female ☐
6. Highest educational qualification:
    (a) Master's degree ☐   (b) PhD in view ☐   (c) PhD ☐
    (d) Other (please specify) . . . .
7. Rank:
    (a) Assistant Lecturer/Equivalent ☐   (b) Lecturer II ☐   (c) Lecturer I ☐
    (d) Senior Lecturer ☐   (e) Reader ☐   (f) Professor ☐
    (g) Other: . . . .
    Work experience as a lecturer in the university:
    (a) 1–5 ☐   (b) 6–10 ☐   (c) 11–15 ☐   (d) 16–20 ☐
    (e) 21–25 ☐   (f) 26+ ☐
8. **Section B: Awareness of Use of Institutional Repositories (AWIUIR)**
    Please indicate your level of awareness about institutional repositories using the statements below and the scale where SA = Strongly agree, A = Agree, D = Disagree and SD= Strongly disagree

	Items I am aware of	SA	A	D	SD
AWA1	the existence of my university institutional repositories				
AWA2	the benefits of institutional repositories				
AWA3	the content of my university institutional repositories				
AWA4	my university institutional repository policy				
AWA5	the publishers' policy on open-access institutional repositories				
AWA6	the process of depositing my work into institutional repositories				

9. **Section C: Anchor Factors in the Use of Institutional Repositories (ANFUIR)**
   Please indicate your level of agreement with the statements below using the scale where SA = Strongly agree, A = Agree, D = Disagree and SD = Strongly disagree

	Items	SA	A	D	SD
CSE1	I am able to use institutional repositories if there is no one around to show me how to use them				
CSE2	I feel comfortable using institutional repositories on my own				
CSE3	I can confidently download and save files from institutional repositories when needed				
CSE4	I can confidently deposit my scholarly works into our university institutional repository				
CSE5	I can confidently retrieve scholarly works from our university institutional repository				
CSE6	I could use institutional repositories if there was no one around to tell me what to do				
PEC1	I have control over using institutional repositories				
PEC2	I have the resources (e.g. Internet access) necessary to use the institutional repositories				
PEC3	Given the resources and opportunities it takes to use the institutional repositories, it would be easy for me to use the institutional repositories				
PEC4	I have the requisite knowledge to use the institutional repository				
PEC5	The institutional repository is compatible with other systems I use				
PEC6	Given support by the institutional repository manager, I can use institutional repositories				
CA1	I feel nervous about using institutional repositories				
CA2	I am sceptical that my work could be plagiarized if deposited in an institutional repository				
CA3	I hesitate to use institutional repositories for fear of making mistakes I cannot correct				
CA4	Institutional repositories worry me				
CA5	Using institutional repositories scares me				
CA6	Using institutional repositories makes me uncomfortable				
CPLAY1	I am playful when using institutional repositories				
CPLAY2	My using institutional repositories is spontaneous				
CPLAY3	I am creative in using institutional repositories				
CPLAY4	I am original in using institutional repositories				
CPLAY5	I am imaginative when using institutional repositories				
CPLAY6	I am inventive when using institutional repositories				

10. **Section D: Adjustment Factors in the Use of Institutional Repositories (ADFUIR)**

Please indicate your level of agreement with the statements below using the scale where SA = Strongly agree, A = Agree, D = Disagree and SD = Strongly disagree

	Items	SA	A	D	SD
PEJI	I find using institutional repositories enjoyable				
PEJ2	The actual process of using institutional repositories is pleasant				
PEJ3	I have fun using institutional repositories				
PEJ4	Depositing my scholarly work into our university institutional repository is exciting				
PEJ5	Retrieving scholarly works from institutional repositories is pleasurable				
PEJ6	The whole idea of using institutional repositories is delightful to me				
PU1	I use institutional repositories to search for scholarly works				
PU2	I retrieve scholarly works from institutional repositories				
PU3	I deposit my preprint scholarly works into my university institutional repository				
PU4	I deposit my lecture notes into my university institutional repository				
PU5	I deposit the data sets of my scholarly works into my university institutional repository				
PU6	I retrieve lecture notes from institutional repositories				

11. **Section E: Use of Institutional Repositories (UIR)**

Why do you use institutional repositories? Please indicate your level of agreement with the reasons for use of institutional repositories using the scale where SA = Strongly agree, A = Agree, D = Disagree and SD = Strongly disagree

SN	Statement I use institutional repositories because	SA	A	D	SD
i	my works are published alongside other high-quality research				
ii	accessibility to my work is increased				
iii	I can add extra data to the work, such as photos, video, audio or data sets				
iv	the number of citations my work gets increases				
v	my published material is easy to find				
vi	access to the work is cheaper for others				
vii	my work will be permanently archived and available				
viii	the serials crisis is resolved				
ix	depositing my work in the repository protects it from plagiarism				
x	the prestige of my university is enhanced				
xi	my chances of promotion are increased				
xii	a centralized location to document research outputs is useful				
xiii	I tell students to look up my works and works of other colleagues				
xiv	it gives everyone within a research focus access to their colleagues' work to promote collaborative research				
xv	the repository is well indexed and archived				
xvi	the institutional repository is easy to use				
xvii	my scholarly work is disseminated more quickly				
xviii	access to scholarly works is easy				